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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/673,889	09/29/2003	Richard A. Blanchard	GS 162 D1	1992

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EXAMINER	
LE, THAO X	

ART UNIT	PAPER NUMBER
2814	

DATE MAILED: 12/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/673,889	BLANCHARD, RICHARD A.	
	Examiner	Art Unit	
	Thao X Le	2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 September 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *14-29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *14-29* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *09/29/03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. Claims 16-17 objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. 'Material filling the trench is a dielectric' is broadening the scope of claim 14. Assuming 'Material filling the trench further comprises a dielectric'.

Double Patenting

2. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington,* 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

3. Claims 14-29 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-13 of U.S. Patent No. 6479352 in view of US 4671851 to Beyer et al.

Claims 1-13 of Patent 6479352 disclose all aspects of claims 14-29 of the instant application 10/673889.

But, Patent 6479352 does not claim epitaxially depositing trenches a material.

However, Beyer discloses the method of epitaxially depositing silicon in trenches, column 5 lines 50-55. At the time the invention was made; it would have been obvious to one of ordinary skill in the art to use the epitaxially depositing silicon in trenches teaching of Beyer to fill the trenches of Patent 6479352, because such silicon deposition is well established in the art. See also 6468853, 5250461, 4924284, and 4758531.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6452230 to Boden in view of US 6608350 to Kinzer.

Regarding claim 14, Boden discloses a method of forming a power MOSFET in fig. 1 comprising the steps of: providing a substrate 11 of a first conductivity type (N); depositing an epitaxial layer 12 on the substrate, said epitaxial layer having a first conductivity type (N), column 2 lines 3-4; forming first and second body regions 15/16, column 2 line 17, in the epitaxial layer 12 to define a drift region therebetween, said body regions having a second conductivity type (P), fig. 1; forming first and second source regions 20/21, column 2 line 16, of the first conductivity type (N) in the first and second body regions 15/16, respectively; and forming a plurality of trenches 49/50/51, column 2 line 37, in said drift region of the epitaxial layer 12; depositing in said trenches a material 53, column 2 line 41, said trenches 49/50/51 extending toward the substrate from the first and second body regions 15/16;

But, Boden does not discloses epitaxially depositing in trenches a material having a dopant of the second conductivity type and diffusing at least a portion of said dopant from said trenches into portions of the epitaxial layer adjacent the trenches.

However, Kinzer discloses depositing in trenches a material 4, fig. 1, having a dopant of the second conductivity type, column 2 line 27, and diffusing at least a portion of said dopant from said trenches 3 into portions of the epitaxial layer 2 adjacent the trenches 2, fig. 1. At the time the invention was made; it would have been obvious to one of ordinary skill in the art to use the layer 4 teaching of Kinzer to replace the material 53 of Boden, because the alternate N and P regions would have depleted out, allowing an

almost uniform electric field distribution in the region between the trenches as taught by Kinzer, column 2 lines 64-67.

With respect to epitaxial depositing material, Kinzer discloses the layer 4 can be made with any suitable process, column 2 line 26. At the time the invention was made; it would have been obvious to one of ordinary skill in the art to replace the teach of Boden and Kinzer with epitaxial silicon deposition in trench, because it would have produced the same structure as claimed and such epitaxial silicon method is well documented in the art, such as Beyer (4671851) in column5 lines 50-5, Balasubramanian (6468853) in column 4 line 34, Sparks (5250461) in column 8 lines 3-5, Beyer (4924284) in column 4 line 15, or Beyer (4758531) in column 4 line 64.

Regarding claim 15, Boden discloses the method of claim 14 wherein said deposited material filling the trench includes silicon, column 2 line 40.

Claims 16-17, Boden discloses the method wherein material filling the trench further comprises a silicon dioxide 61, column 3 line 3.

Regarding claim 18, as discussed in claim 14 Boden does not disclose the method wherein dopant is boron. But Kinzer discloses the P doped layer 4 that would comprise boron dopant.

Regarding claim 19, Boden discloses the method further comprising the step of at least partially oxidizing silicon, column 2 line 40.

Regarding claim 20, Boden discloses the method wherein material filing the trench includes silicon 48 and a dielectric 60, fig. 2.

Regarding claims 21-26, Boden discloses t he method wherein body region include deep body region, fig. 1, wherein the trench is formed by providing a masking layer define by at least one trench, and etching the trench defined by the masking layer, column 49-55 and incorporated by reference US Pat 5549762, wherein said body region is formed by implanting and diffusing a dopant into the substrate, column 2 lines 9-15, wherein the epitaxially depositing step includes the step of epitaxially depositing a plurality of layers 11/12, at least two of said layers having different dopant concentrations, fig. 1, wherein said plurality of layers includes an interface layer 12 adjacent to one of the body regions 15/16, said interface layer having a lower dopant concentration than an interior layer of the epitaxially layered material 11, fig. 1, wherein said epitaxially layered material has a dopant concentration that is reduced in the vicinity of the body regions relative to the dopant concentration profile in the vicinity of the substrate, fig. 1.

Regarding claims 27-18, Boden discloses the method wherein said portions of the epitaxial layer 12 adjacent the trenches 49 have a substantially uniform dopant concentration in a direction lateral to the trenches, wherein said portions of the epitaxial layer 12 adjacent the trenches have a substantially uniform dopant concentration in a direction lateral to the trenches, and wherein a power MOSFET made in according with the method.

Boden and Kinzer discloses the device are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a *prima facie* case of either anticipation or obviousness has been established. *In re Best*, 195 USPQ 430, 433 (CCPA 1977).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thao X Le whose telephone number is (571) 272-1708. The examiner can normally be reached on M-F from 8:00 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M Fahmy can be reached on (571) 272 -1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Thao X. Le
09 Dec. 2004

Conclusion

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Thao X. Le
09 Dec. 2004

HOAI PHAM
PRIMARY EXAMINER